



Emergency Planning For Water Supply Interruptions At Medical Facilities

James F. Harris - NAVFAC

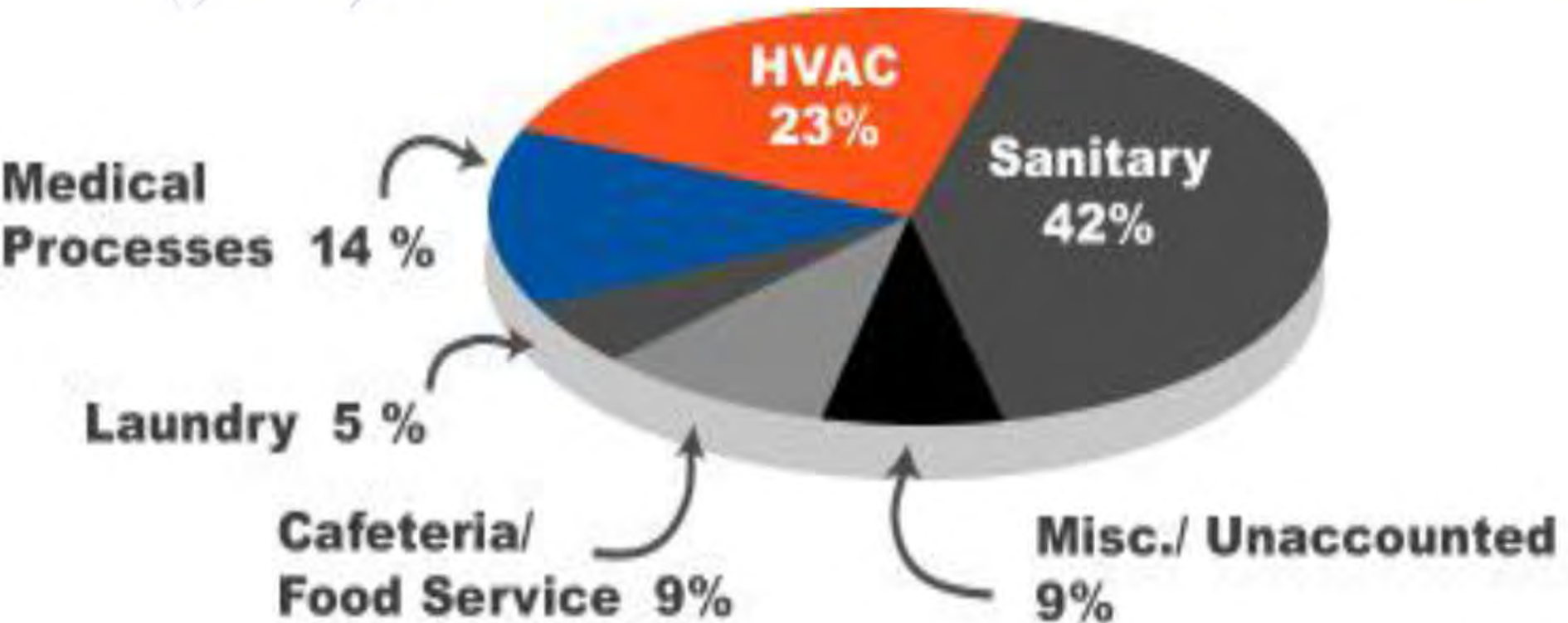
Dave Hildebrand – AH ENV

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Outline of Presentation:

- **Introduction**
- **Background**
- **Approach**
- **Results**
- **Conclusions**
- **Application to other Navy Medical Facilities**



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For Emergency Water Supply Interruptions:

- Alternative supplies may not be available
- Limited information water on demands for critical functions
- Impacts of loss of water supply can be greater than loss of power



Reported Water Supply Interruptions at Medical Facilities [10yrs]:

| Hours | No. of Facilities |
|-------|-------------------|
| 0-6 | 14 |
| 7-12 | 8 |
| 13-24 | 2 |
| 27-72 | 4 |
| >72 | 5 |

Emergency Planning for Water Supply Interruptions:

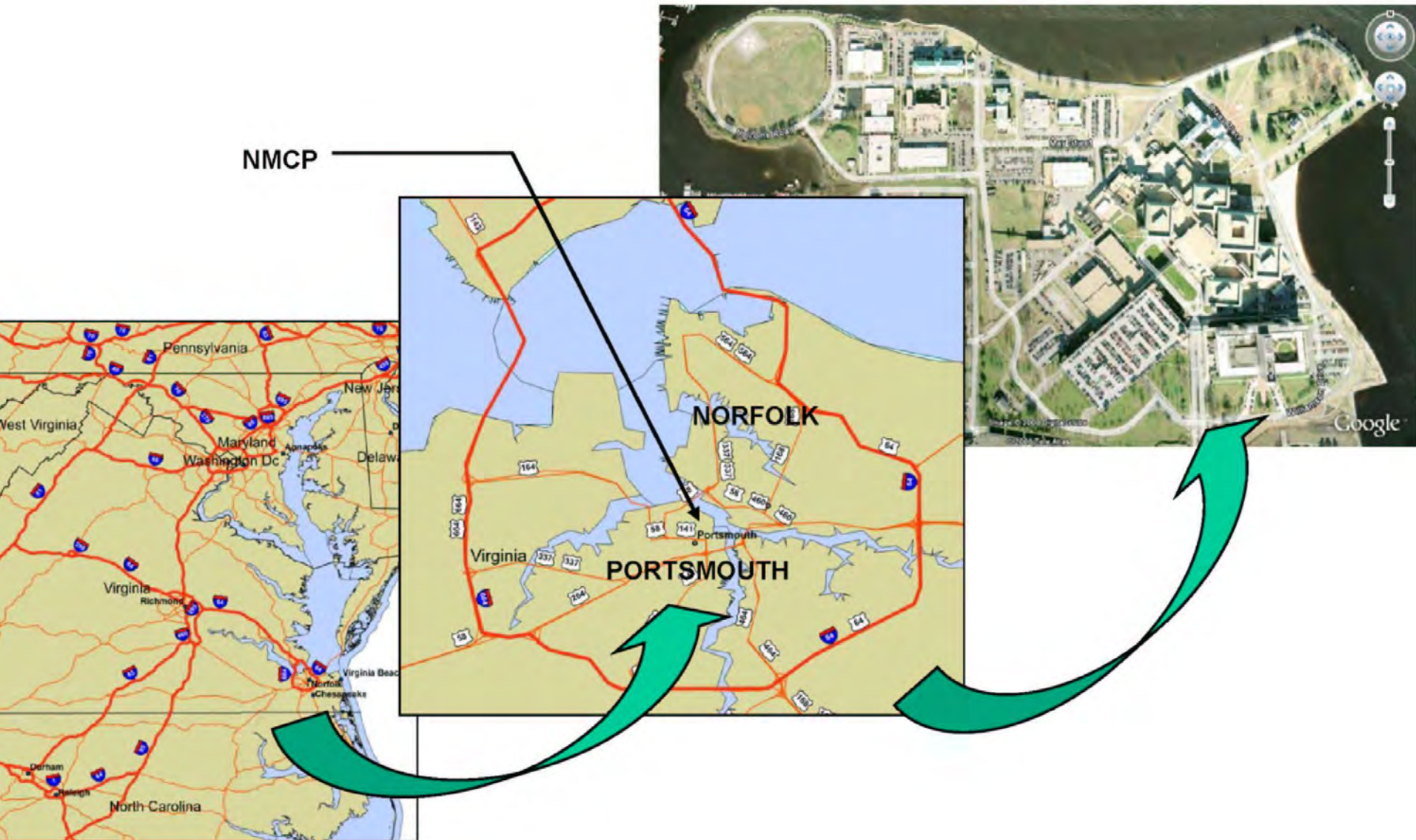
- **Estimate water required for various hospital functions**
- **ID critical functions that need to remain in operation**
- **ID functions that can be curtailed and how to curtail them**
- **Estimate quantity/quality required for essential functions**
- **ID alternative supplies and how to access them**

Pilot Project:

- **NMC, Portsmouth VA**
- **Address potential loss of water supply at facility**
- **Evaluate methods for other Navy Medical Facilities**

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NMC Portsmouth:

- **Oldest operating hospital in the Navy**
- **112-acre complex**
- **Includes:**
 - **Main hospital**
 - **Logistics & administrative offices**
 - **Public works**
 - **Central energy plant**
 - **Gymnasium & other support buildings**

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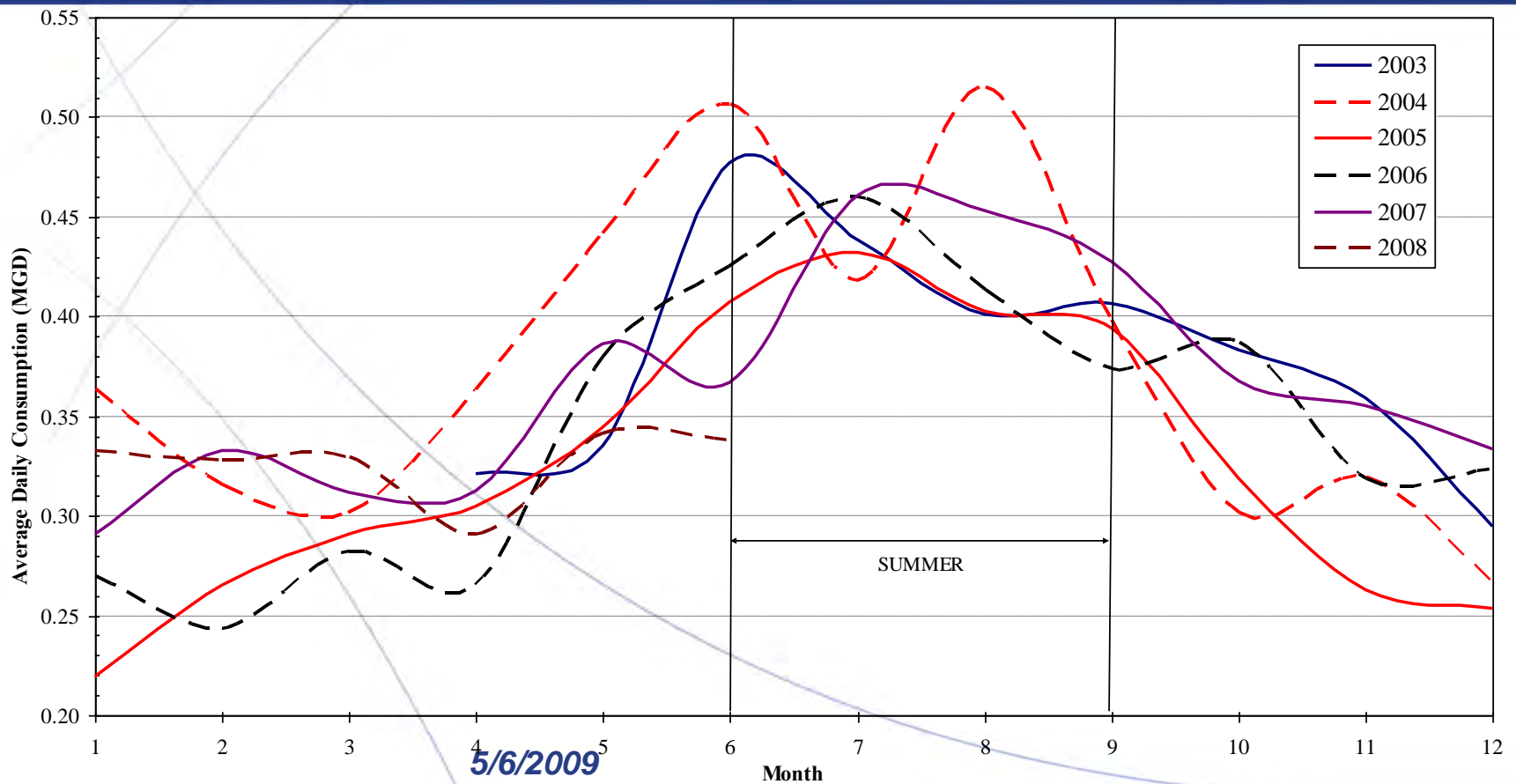


Approach:

- **Site visits**
- **Departmental Interviews**
- **Collection & review of existing information**
- **Flow metering of targeted areas**
- **Development of emergency plan**

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Department Interviews – Results:

- **Bldg 2: Acute Care Facility = core functions**
- **Bldgs: 249 & 250 – Information Technology**
- **Bldg 20: Central Energy Plant**

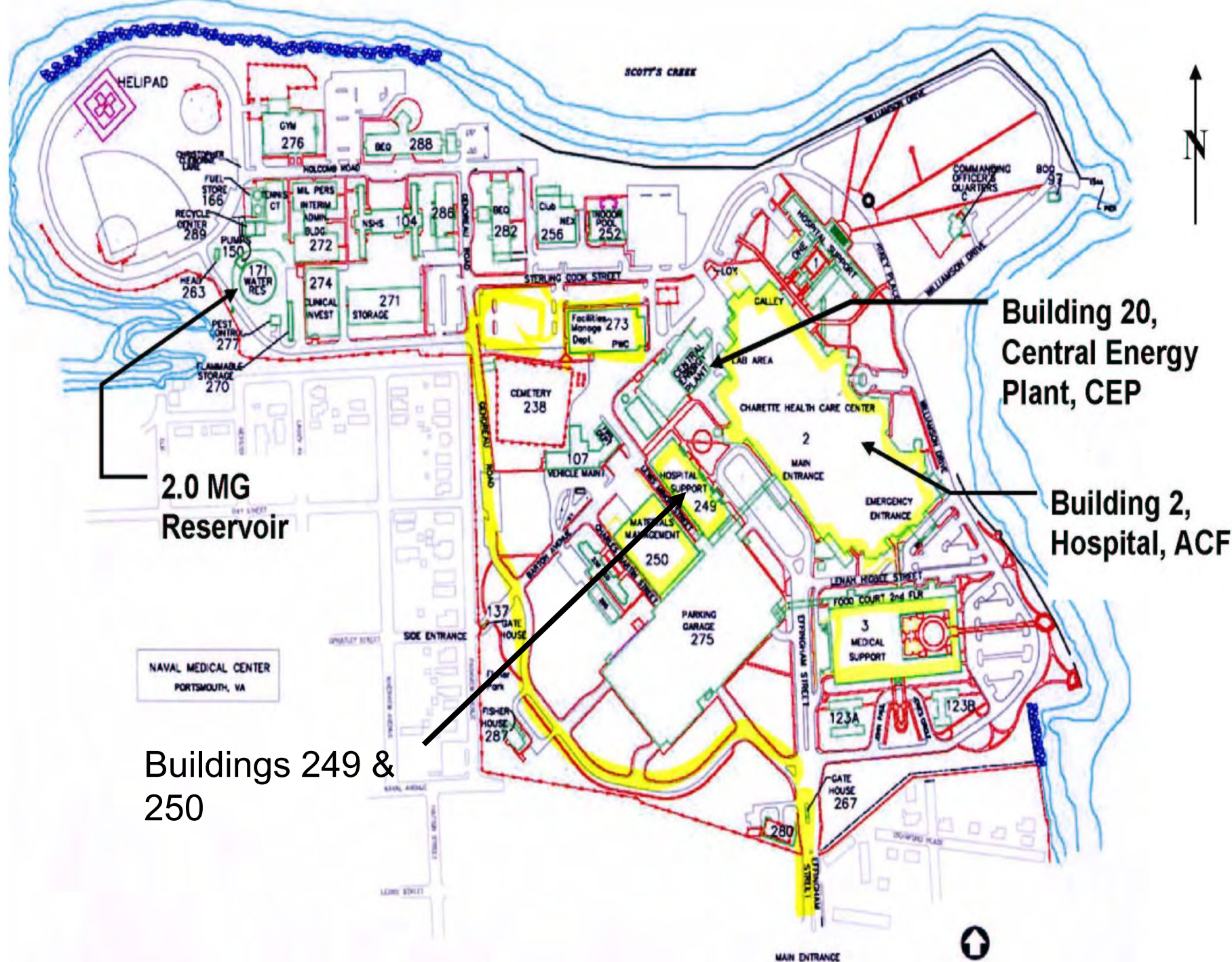


Table 5-1. Summer Month Water Demand

| Demand | Water Demand (gpd) |
|---|-----------------------|
| Industrial (Building 20) | 212,000 |
| Sanitary (Buildings 2 and 3) | 169,000 ¹ |
| Medical Processes (Buildings 2 and 3) | 36,000 ¹ |
| Cafeteria/Food Service (Buildings 2 and 3) | 9,000 |
| Laundry | 0 ² |
| Total | 426,000 |

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Table 5-2. Initial Assessment of Critical Demands - Building 2

| Department | Floor | Demand (gpd) | % of Total Demand |
|--|-----------------|--------------|-------------------|
| Sterilization | 3 rd | 11,000 | 5.2% |
| Galley | 1 st | 9,000 | 4.2% |
| Operating Rooms | 3 rd | 9,000 | 4.2% |
| Emergency room | 1 st | 8,000 | 3.8% |
| All laboratories | 1 st | 7,500 | 3.5% |
| Nephrology/dialysis | 2 nd | 6,600 | 3.1% |
| Critical care/ICU | 3 rd | 5,000 | 2.4% |
| Neonatal infant care unit (NICU) | 4 th | 4,400 | 2.1% |
| Gastroenterology clinic | 2 nd | 1,200 | 0.6% |
| Post anesthesia care unit (PACU) | 3 rd | 1,200 | 0.6% |
| Compo B (complicated labor & delivery) | 4 th | 1,000 | 0.5% |
| Dental/Oral maxifacial | 2 nd | 900 | 0.4% |
| Critical care step down unit (SDU) | 3 rd | 650 | 0.3% |
| PACS computers | 1 st | 150 | 0.1% |
| Total | | 65,600 | 30.9% |

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Metering of Critical Areas



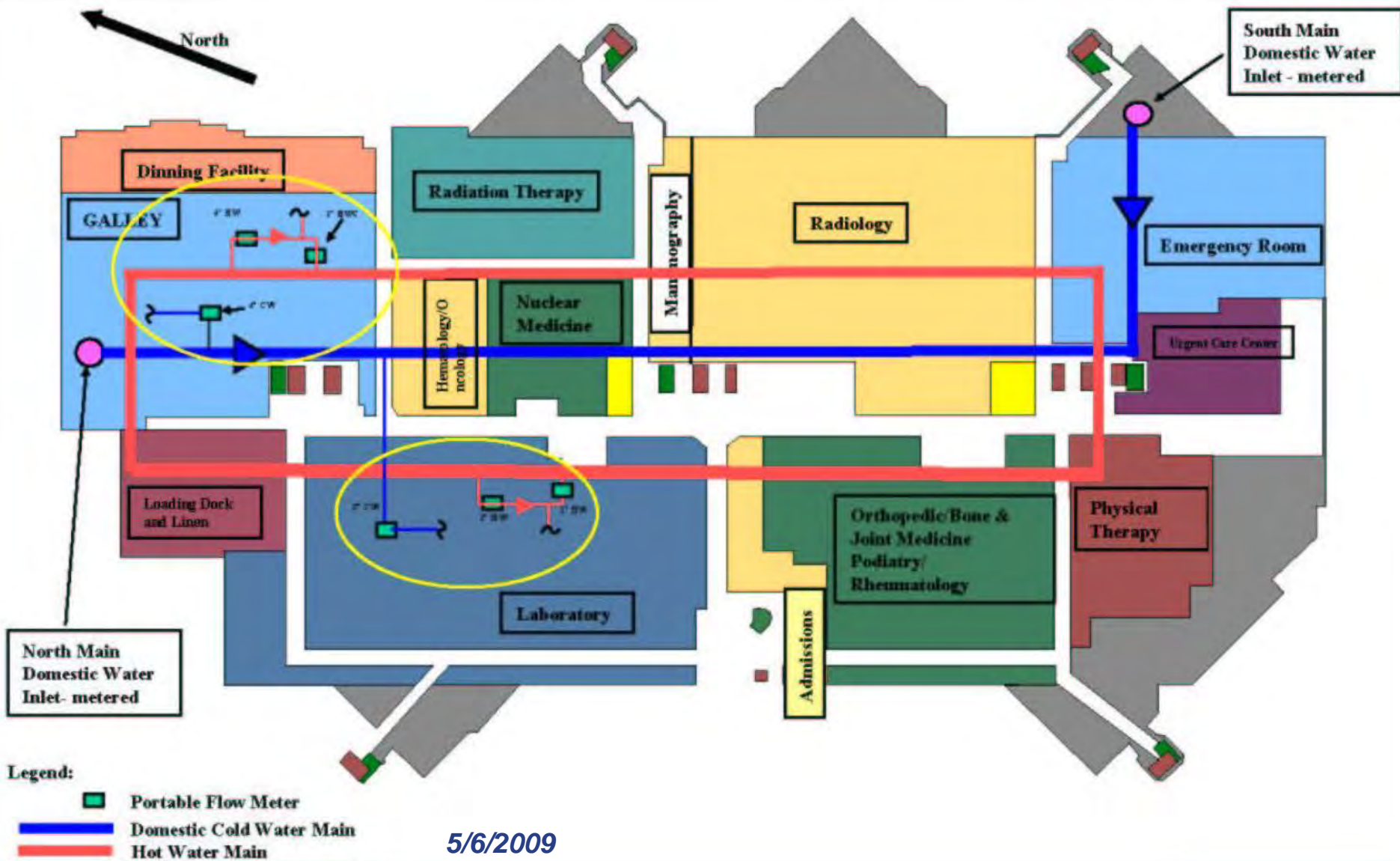
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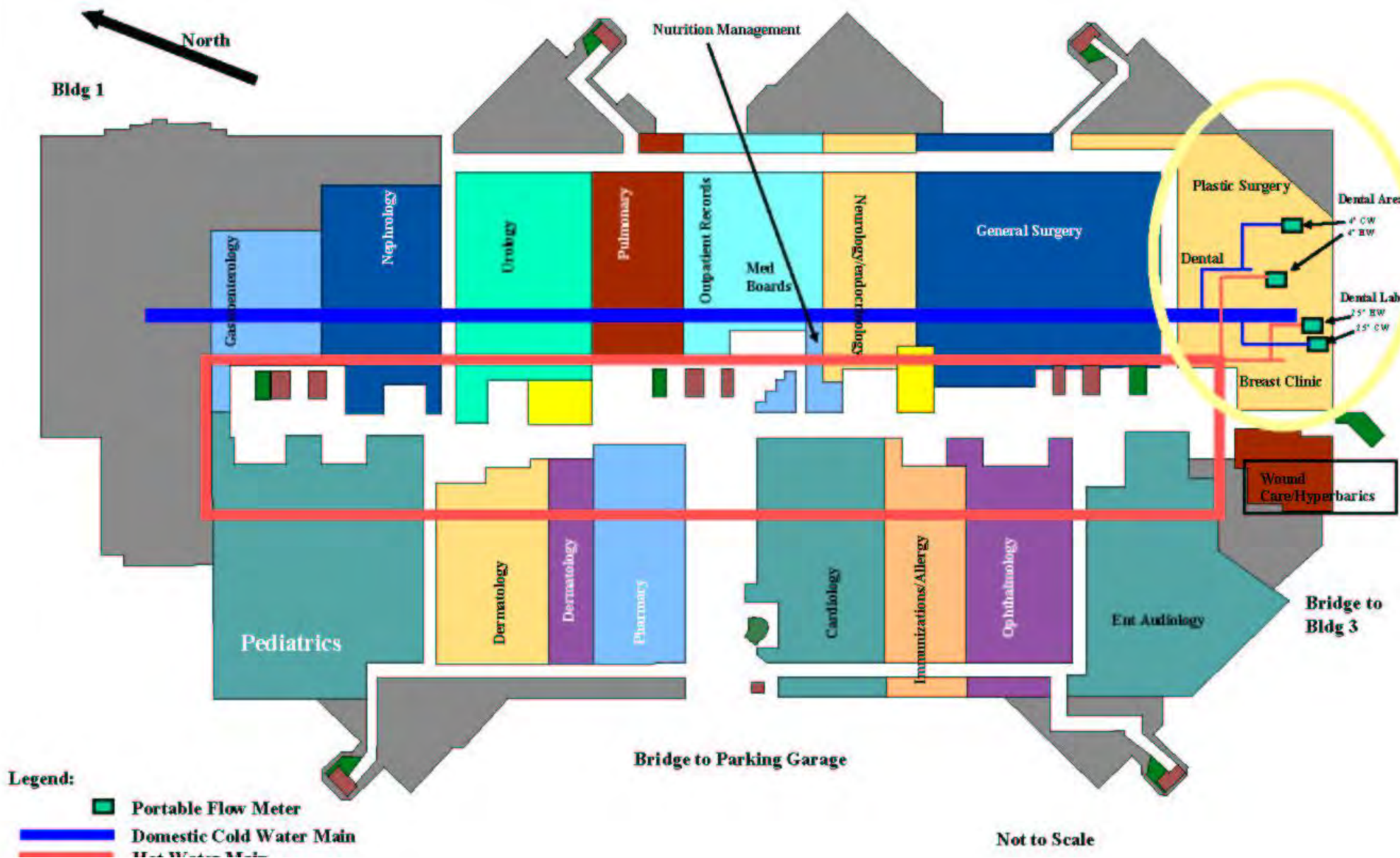


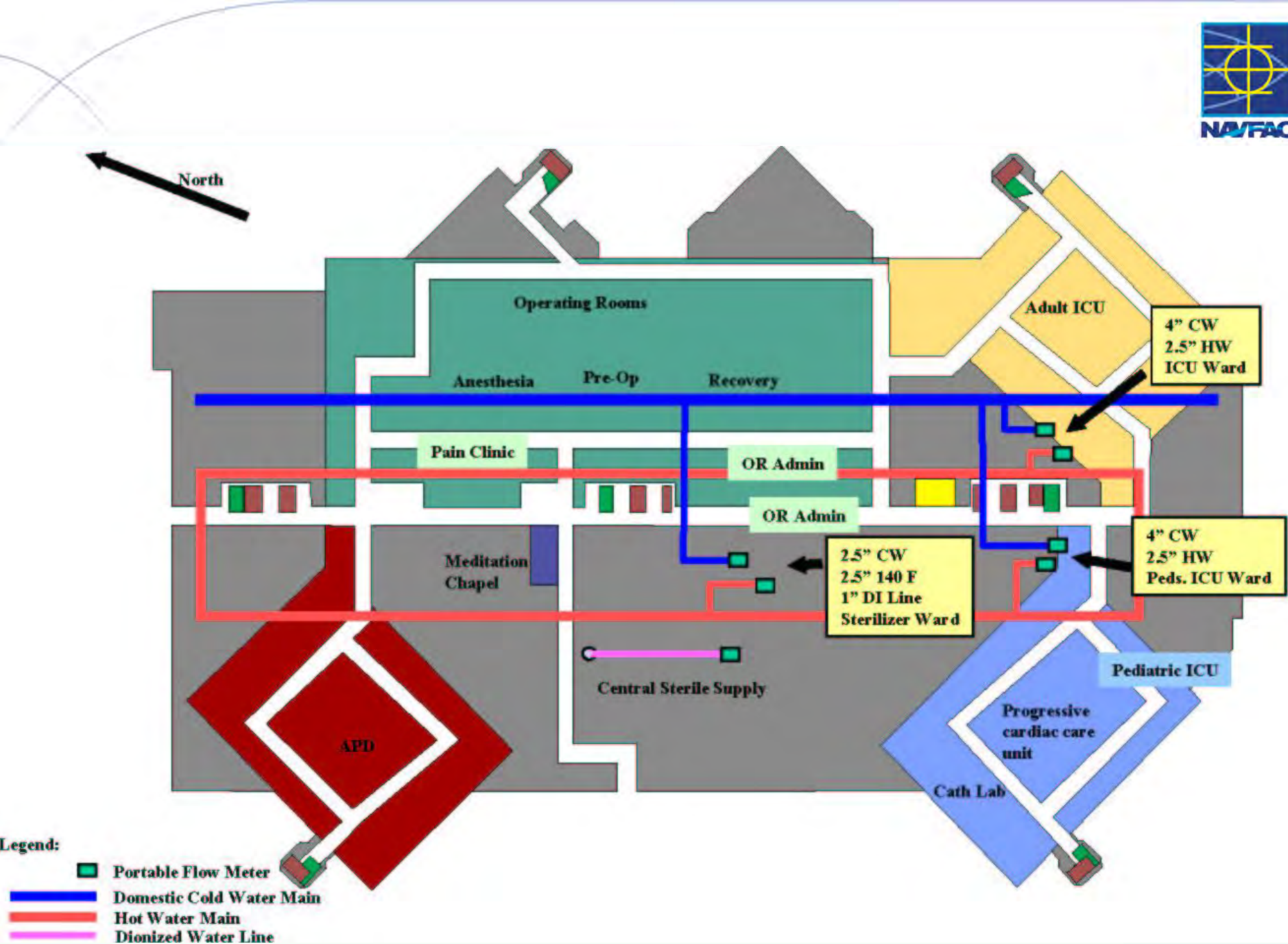
Table 5-3 Building 2 – Demand Estimates and Metered Consumption

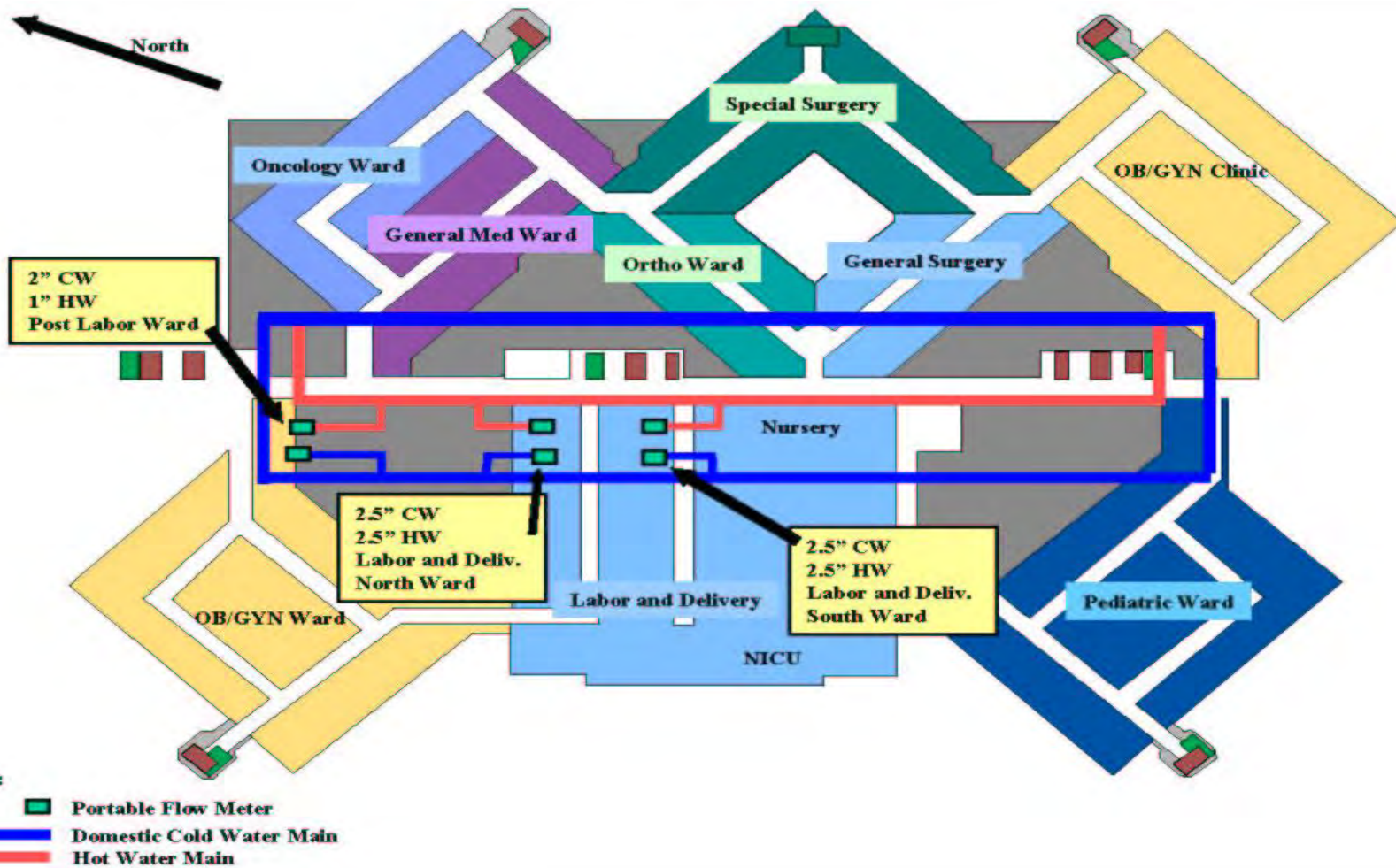
| ACF Department | Estimated Demand (gpd) | Metered Consumption (gpd) | % Difference from Estimate |
|-------------------------------------|------------------------|---------------------------|----------------------------|
| Galley | 9,600 | 9,000 | 6.3 % |
| Laboratory | 7,500 | 2,335 | 69.3 % |
| Dental/Oral Maxifacial ¹ | 1,900 | 900 | 42.1 % ¹ |
| Dental Laboratory | - | 200 | - |
| Pediatric ICU | 2,060 | 12,800 | -521.4 % |
| ICU | 850 | 5,000 | -481.4 % |
| Labor & Delivery 4M | 1,300 | 7,200 | -453.8 % |
| Labor & Delivery 4M | 1,200 | 660 | 41.7% |
| Post Partum | 2,370 | 1,300 | 45.8 % |
| Subtotal | 26,820 | 39,400 | -46.9 % |
| Total ² | 120,540 | 212,270 | 43.2% |
| Unaccounted water | | 91,730 | |

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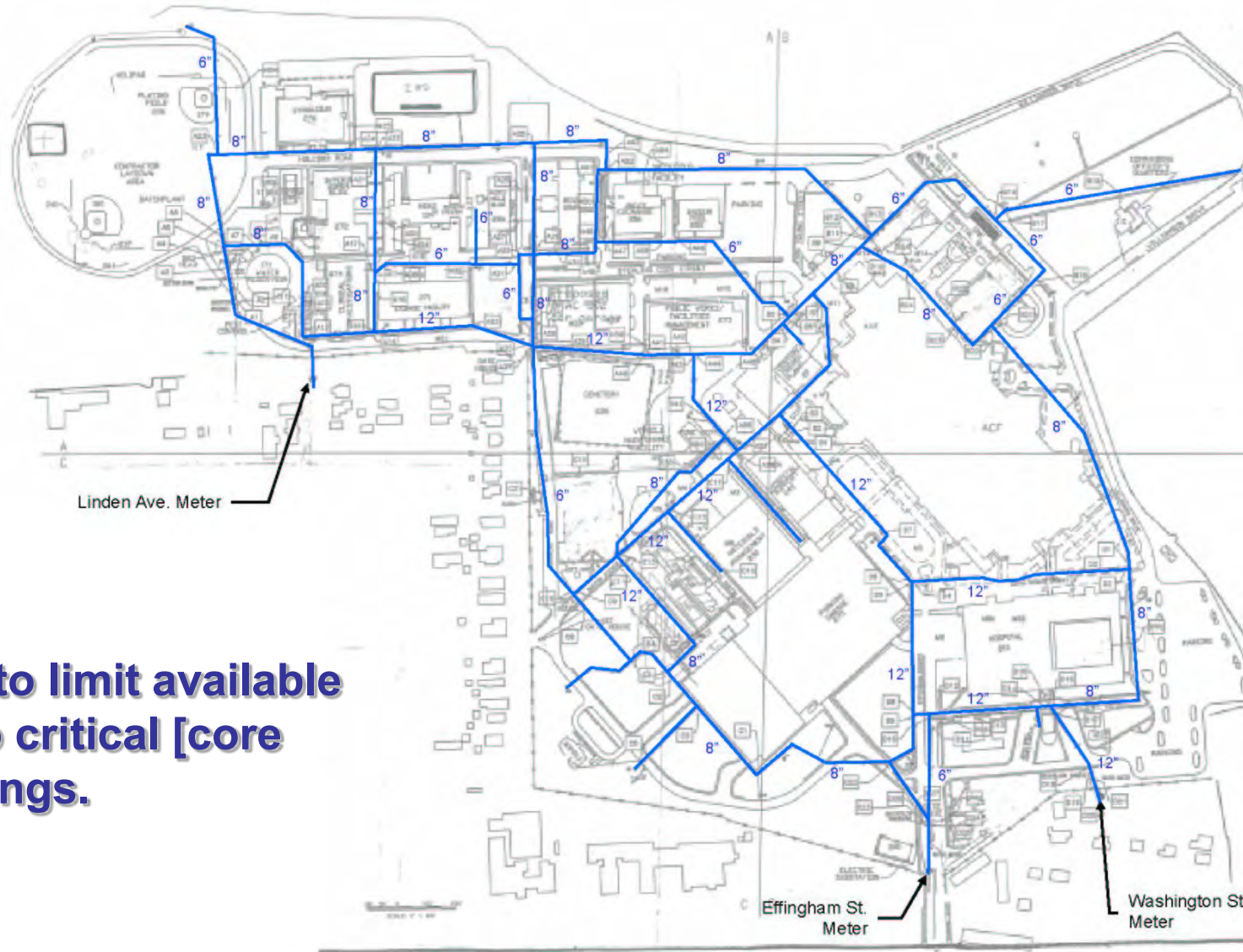
Metering results point to:

- **Piping drawings may not be accurate**
- **Large amount of unaccounted for water**
- **Valve isolation within a building not practice**
- **Most reliable information is water entering building**
- **Common issue with both military an civilian medical facilities**

Emergency planning focus:

- **Valve isolation of buildings**
- **Lock off non-critical functions within buildings**

Diagram of Distribution System



Use DS valves to limit available water supply to critical [core function] buildings.

Results for NMC Portsmouth

Table ES-2. Estimated Reservoir Operational Duration

| Area Supplied With Water | Average Summer Consumption (MGD) | Days of supply when Reservoir at 2 MG | Days of supply when Reservoir at 1.68 MG | Days of supply when Reservoir at 1 MG | Days of supply when Reservoir at 0.5 MG |
|-------------------------------------|----------------------------------|---------------------------------------|--|---------------------------------------|---|
| NMCP Complex | 0.433 | 4.6 | 3.9 | 2.3 | 1.2 |
| Building 2 | 0.210 | 9.5 | 8.0 | 4.8 | 2.4 |
| Building 20 | 0.212 | 9.4 | 7.9 | 4.7 | 2.4 |
| Buildings 2 and 20 | 0.422 | 4.7 | 4.0 | 2.4 | 1.2 |
| Building 2 Critical and Building 20 | 0.278 | 7.2 | 6.0 | 3.6 | 1.8 |

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Other considerations:

- **Cooling towers are largest water users [increase cycles of conc.?)**
- **Waterless alternatives [handwashing, etc]**
- **Helicopter landing site considerations**
- **Flush valves may need to be closed manually**
- **ID tanks/connections/methods to received supplemental supplies if available**

Conclusions:

- **Water audit successfully identified critical water users, steps required to limit water use & development of emergency water conservation steps**
- **Implementation of emergency water conservation measures & valve isolation can extend the operation of critical functions.**
- **Valve isolation of complete buildings & locking off non-critical functions within a building is generally most practical.**
- **Valve isolation within a building generally not practical.**

Application to other Navy Medical Facilities

Basic steps:

- **Step 1 – Estimate water usage**
- **Step 2 – Identify critical functions**
- **Step 3 – Develop conservation plans**
- **Step 4 – Identify alternative water supplies**
- **Step 5 – Evaluate the information**
- **Step 6 – Develop emergency water conservation plan**

Application to other Navy Medical Facilities

Estimating water use considerations:

- **Heavy reliance on DS meters & meters on lines entering buildings**
- **Confirm calibration of meters**
- **Limit use of portable meters [sub metering]**

Alternative Water Supplies:

- Wells
- Storage tanks [onsite & offsite]
- Tanker trucks [certified food grade only]
- Talk to water supplier

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Down the Road...

Navy approach to emergency planning for water supply interruptions at medical facilities is now forming the basis for nationwide guidance that is being prepared jointly by AWWA, CDC and Homeland Security